

# A 3D Printer Enabled, High Performing, Microgravity Compatible, and Versatile Sample Preparation Platform, Phase I

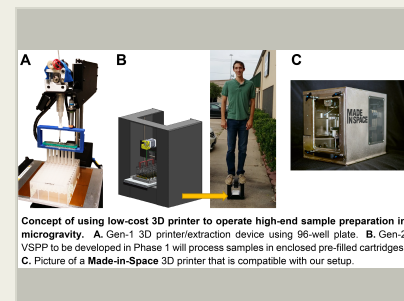
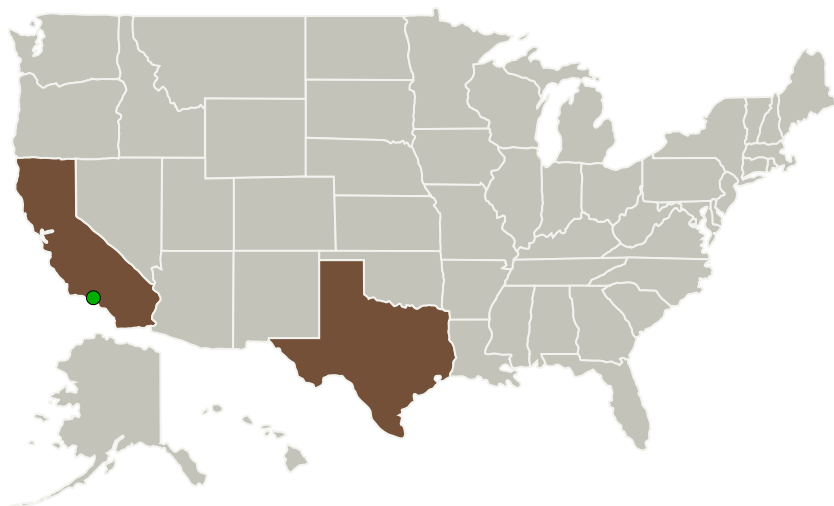
Completed Technology Project (2017 - 2017)



## Project Introduction

AI Biosciences proposes to demonstrate the ability of a microgravity-compatible, compact, light-weight, and automated versatile sample preparation platform (VSPP) that processes samples from various sample matrices (swab, potable water, blood, urine, etc.) to yield high quality nucleic acids for downstream molecular detection and identification in a closed-cartridge system. Its primary function will enable NASA to rapidly identify microorganisms that could affect crew safety. This near-term deployable cartridge and platform system also has the option to perform isothermal and PCR amplification of nucleic acids. This highly flexible system will allow previously complicated, labor-intensive, and time consuming processes to be carried out by a turn-key and closed system using pre-filled cartridges. We have demonstrated on the ground in a laboratory setting that the entire setup for high quality DNA/RNA extraction from urine, whole blood, serum, and saliva can be achieved via simple and reversible retrofitting of a low-cost fused deposition modeling (FDM) based 3D printers ranging from \$199 to \$750. The VSPP can also be used to capture and purify cell and protein targets. The ability of having a dual-use 3D printer in-flight to carry out sample preparation and additive manufacturing in-flight can be an attractive option in long duration space flights.

## Primary U.S. Work Locations and Key Partners



A 3D Printer Enabled, High Performing, Microgravity Compatible, and Versatile Sample Preparation Platform, Phase I Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
AI Biosciences, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	College Station, Texas
● Jet Propulsion Laboratory (JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Texas
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## Images



Concept of using low-cost 3D printer to operate high-end sample preparation in microgravity. A. Gen-1 3D printer/extraction device using 96-well plate. B. Gen-2 VSPPP to be developed in Phase 1 will process samples in enclosed pre-filled cartridges. C. Picture of a Made-in-Space 3D printer that is compatible with our setup.

## Briefing Chart Image

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Briefing Chart Image

(<https://techport.nasa.gov/image/130982>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

AI Biosciences, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

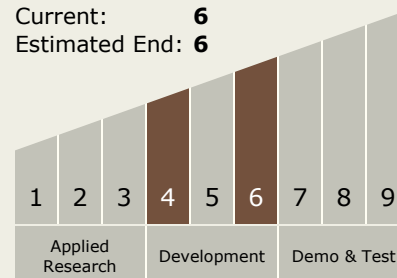
Season Wong

## Technology Maturity (TRL)

Start: 4

Current: 6

Estimated End: 6



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - └ TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System